

INTRAVENOUS CATHETER AND INSERTION DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a device for the insertion of a flexible catheter into a vein of a patient for intravenous administration of fluids. More Particularly the invention relates to devices wherein the flexible catheter is inserted into the vein has a sharp needle about which the catheter is snugly mounted, and the needle and catheter are inserted into the vein and the needle removed leaving the catheter in place. Most particularly the invention relates to a catheter insertion device wherein the insertion needle is retractable into the device after removal and a removable cap is placed over the insertion end of the catheter insertion after use to prevent accidental needle prick and a resealable seal is placed over the insertion end to prevent bodily fluids from exiting the insertion device.

2. Related Art

The development of flexible intravenous catheters has greatly increased the comfort of patients during intravenous administration of medicinal fluids. The flexible catheter prevents unwanted puncture of the vein. The flexible catheter normally consists of a narrow tube of NYLON or TEFLON construction with a rigid member attached at the rear end for connection to the source of fluid to be administered.

Because the catheter is flexible it cannot by itself be inserted into the vein. Therefore, the catheter is snugly nested about a sharp needle which can be inserted into the vein. After insertion the sharp needle is withdrawn leaving the catheter in place for connection to the fluid source. The insertion needle is simply discarded as it is intended for a single use only. Often the needle is discarded in a careless manner leaving the

exposed needle point as a hazard.

Accidental needle prick has been a problem for years in the health care industry.

However, the advent of the HIV or AIDS virus has focused attention on the problem. While several diseases, such as viral hepatitis, may be contracted from bodily fluids of infected persons, HIV has caused the most concern because to date no preventative or cure is known. Protection against accidental needle prick is expected to remain a concern even after a vaccine or cure is found, an ounce of prevention being worth a pound of cure.

My earlier U.S. patents 5,019,019 and 5,176,650 have addressed this problem in regard to catheter insertion devices. However there has remained the possible exposure to the patient's bodily fluid (blood) after the needle has been removed.

SUMMARY OF THE INVENTION

To protect against accidental needle prick a catheter and insertion device are provided wherein the needle is retractable within the device after insertion of the catheter. The device comprises a hollow barrel or tube of semi-rigid plastic material into which the needle can be retracted after use. The insertion needle is mounted on a carrier with the sharp end oriented toward the insertion end of the barrel with the catheter snugly fit about the needle. A sliding tab is mounted to the carrier by an outwardly biased flexible member and extends through a longitudinal slot in the barrel. Near either end of the slot V notches are provided in the internal wall of the barrel to engage locking hubs on the sliding tab to releasably lock the carrier in either the exposed or retracted position. A flat catheter locking surface is provided at the insertion end of the barrel with a reverse slope to allow the catheter flange to slide onto the flat surface and allow easy retraction of the needle without disturbing the inserted catheter. A resealable closure is located over the insertion

1 end to allow passage of the catheter and carrier and then close when the carrier and
2 needle are retracted. The closure prevents any bodily fluids from exiting the barrel after
3 use. The catheter insertion device is shipped with a removable cap over the end with is
4 replaced after the insertion needle has been retracted into the hollow barrel. The cap
5 covers the length of the longitudinal slot to prevent bodily fluids from exiting through the
6 slot.

7 **BRIEF DESCRIPTION OF THE DRAWING**

8 FIG. 1 is a side elevational view in cross section showing the catheter insertion device with
9 the needle and catheter in the retracted position.

10 FIG. 2 is a side elevational view if cross section showing the needle and catheter in the
11 exposed position.

12 FIG. 3 is a top view of the catheter insertion device the needle and catheter in the exposed
13 position.

14 FIG. 4 is a side elevational view in cross section showing the needle retracted from
15 the catheter.

16 FIG. 5 is a perspective view of the sliding tab showing one of the locking tabs for locking
17 the carrier in the exposed or retracted position.

18 FIG. 6 is a side elevational view in cross section showing the catheter insertion device as
19 shipped with a removable cap over the insertion end.

20 FIG. 7 is a side elevational view is cross section showing the catheter insertion device
21 showing the removable cap replaced after the catheter has been inserted and the insertion
22 needle retracted into the barrel.

23 FIG. 8 is a front view taken along line 8-8 of FIG. 1 showing the resealable closure.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

For a detailed description of the preferred embodiment the reader is referred to the appended figures in which like components are given like numerals for ease of reference.

FIG. 1 generally shows a catheter insertion device 1 having a hollow cylindrical barrel 10 of semi-rigid plastic material. The barrel 10 may be tapered slightly at the insertion end for ease of use. For orientation purposes the barrel 10 is defined as having an insertion end 11 and a distal end 12. A flexible catheter 20 is snugly fit about an insertion needle 40 and both mounted on a carrier 50 which is slidably mounted within the barrel 10. In FIG. 6 the device is depicted as proposed to be shipped with the carrier 50, needle 40 and catheter 20 withdrawn into barrel 10 and a removable cap 120 secured about the insertion end. A resealable closure comprising 111A and 111B is shown near the insertion end. Shipment will be in a sterile package (not shown). In this configuration no protective sheath about the needle 40 and catheter 20 is required as in other catheters because they are encased by the barrel 10 and cap 120.

In FIG. 2 the device is depicted with the cap removed and the needle 40 and catheter 20 exposed for insertion into the vein of the patient. Flap 111A of resealable closure is shown open allowing the needle 40 and catheter 20 to pass there through. FIG. 3 is an overall depiction with the device rotated 90° about its longitudinal axis clearly showing the sliding slot 90 in the barrel 10. FIG. 4 depicts the device with the needle 40 retracted into the barrel 10 leaving the catheter 20 in place. FIG. 7 depicts the removable cap 120 placed over the insertion end and extending to cover the slot 90. FIG. 5 depicts the sliding tab 60 in enlarged detail.

1 Referring now in particular to the barrel 10 as depicted in FIG.'s 1-4, it is shown to
2 have a longitudinal slot 90 partially extending between the two ends 11 and 12. Near
3 either end of the slot are circumferential V notches 81 and 82 as shown. Additionally, at the
4 insertion end there is provided an inwardly projecting circumferential shoulder 70 having
5 a rear surface 71 sloped radially outwardly toward the distal end 12 and a flat surface 72
6 facing the insertion end 11. The resealable closure 111A, 111B is shown just inside the
7 insertion end. As seen better in FIG. 8 the resealable closure 111 is seen to comprise two
8 semicircular pieces 111A and 111B of elastic material which overlap to seal the end of the
9 barrel. The flaps 111A and 111B may be forced apart and open by the needle 40 and
10 catheter 20 but reclose when the needle 40 is withdrawn within the barrel.

11 Referring again to FIG.'s 1-4, the needle carrier 50 is slidably mounted within the
12 barrel 10 having the sliding tab 60 mounted thereto by base 65 and flexible member 62
13 which biases the tab outward to extend through slot 90. Referring now to FIG. 5 the tab
14 60 is shown to have V topped hubs 63 and 64 on either side (only one shown in FIG. 5).
15 As member 62 biases tab upward V topped hubs are forced into releasable locking
16 engagement with either of V shaped notches 81 or 82.

17 As may be more easily seen in FIG. 4 the insertion needle 40 is mounted to carrier
18 by mounting post 51 which includes a forward projecting frusto-conical section 52.
19 Normally the longitudinal axis of the needle 40 will be aligned with the longitudinal axis of
20 the barrel 10. The flexible catheter 20 is mounted snugly about the insertion needle 40
21 with the sharp point 41 of needle extending from the catheter end 21. Catheter 20 includes
22 a hollow base having two frusto-conical sections 30 and 31. In particular frusto-conical

1 section 31 is nested over needle base section 52. At the rear or distal end of catheter base
2 30 a circumferential flange 110 extends outward the outer diameter of which is slightly
3 greater than the inner diameter of barrel shoulder 70.

4 In use, the catheter and insertion device are removed from their sterile packaging
5 with the needle carrier 50, needle 40 and catheter 20 in the retracted position, the carrier
6 20 being locked into the retracted position by engagement of the V topped hubs 63 and 64
7 with rear V notch 82. The user removes the cap 120 and presses down (or inwardly) on
8 tab 60 to release the hubs 63 and 64 from the rear notch 82 and slides the carrier 50 with
9 the needle 40 and catheter 20 forward toward the insertion end. The needle 40 and
10 catheter pass through resealable closure 111, and the flange 110 passes over the sloped
11 surface 71 and engages surface 72 at the same time as the hubs 63 and 64 engage the
12 front notch 81. The catheter 20 may then be inserted into the patient's vein. The user
13 again presses downward on the tab 60 to release the hubs 63 and 64 from the front V
14 notch 81 and slides the carrier and needle toward the distal end, the engagement of the
15 flange 110 against the flat surface 72 prevents the catheter 20 from also being retracted
16 leaving it in place. As the needle 40 is retracted the resealable closure 111 recloses. The
17 needle is locked into the retracted position by the biasing force of flexible member 62. The
18 cap 120 is replaced and the whole assembly discarded with the needle 40 encased by the
19 barrel 10 and cap 120. A small clearance 73 between flange 110 and shoulder 70
20 prevents the catheter 20 from sticking within the end 11 of the barrel 10. Alternatively, the
21 insertion may be withdrawn from the catheter 20 and then the needle 40 retracted.
22 The barrel is sealed by the resealable closure 111 and cap 120.